Preparation of Durable and Selective Mo-CHA Catalysts for Methane Dehydroaromatization

High-dispersion Mo on CHA nanosheets that sustain conversion and benzene selectivity across many reaction/regeneration cycles.

Researchers at Purdue University have demonstrated the methane dehydroaromatization (DHA) reaction using molybdenum supported on chabazite nanosheets. Molybdenum chabazite (Mo-CHA) zeolites have not been widely studied for the methane DHA reaction due to low conversion and selectivity to benzene. This is due to the low dispersion of Mo on CHA and difficulty of benzene diffusion within the zeolite. However, unlike Mo-MFI, Mo-CHA zeolites do not dealuminate during regeneration. Using Mo-nanosheet CHA zeolites, the Purdue researchers demonstrated a significant increase in measured DHA rates per Mo and benzene selectivities compared to Mo supported on CHA with larger crystal sizes. In addition, the researchers reported that the catalyst rates remain unchanged during 13 cycles of reaction-regeneration, in contrast to typically used Mo-MFI zeolites that show irreversible deactivation when subjected to 10 reaction-regeneration cycles.

Technology Validation: The researchers' method demonstrated higher conversion and selectivity than traditional Mo-CHA and no dealumination, unlike traditional Mo-MFI.

Advantages:

- Higher conversion and selectivity to benzene than previous results for Mo-CHA

- No dealumination

Applications:

- Petrochemicals production

TRL: 3

Technology ID
2023-GOUN-70213

Category
Chemicals & Advanced Materials/Specialty & Performance Chemicals
Semiconductors/Packaging & Integration
Materials Science & Nanotechnology/Nanomaterials & Nanostructures

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